

REMARKS

Claims 1, 21, and 23 have been amended and claim 20 has been cancelled.

Accordingly, claims 1-19 and 21-38 are currently pending in the application, of which claims 26-38 have been withdrawn from consideration. Claims 1 and 24 are independent claims.

Entry of the Amendment is proper under 37 C.F.R. §1.116 because it (a) places the application in *prima facie* condition for allowance for the reasons discussed herein; (b) does not raise new issues requiring further search and/or consideration by the Examiner because similar subject matter was previously considered by the Examiner and thus further consideration and/or search by the Examiner is not warranted; (c) places the application in better form for appeal, should an appeal be necessary; and (d) responds to formal matters set forth by the Examiner. It is further noted that claim 1 has been amended to include the limitations of dependent claim 20, which was previously examined, and therefore, the amendment does not require further search and/or consideration. For at least these reasons, entry of the present Amendment is respectfully requested. Accordingly, Applicants request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

In view of the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

Rejections Under 35 U.S.C. § 103

Claims 1-7, 9-17, and 19-24 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent No. 5,961,672 issued to Skotheim, *et al.* ("Skotheim") in view of U. S. Patent No. 6,245,458 issued to Sotomura ("Sotomura").

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify the reference or to combine reference

teachings. Second, there must be a reasonable expectation of success. Third, the reference or references, when combined, must disclose or suggest all of the claim limitations. The motivation to modify the prior art and the reasonable expectation of success must both be found in the prior art and not based upon a patent applicant's disclosure. See *in re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The examiner has failed to establish a prima facie case of obviousness. Skotheim discloses a secondary battery including a composite lithium anode and a thin film of lithium ion-conductive polymer interposed between the lithium metal and the electrolyte. However, Skotheim fails to disclose a protective layer including an organosulfur compound and an ionic conductive polymer, as required by independent claims 1 and 24.

As stated in the previous response, Sotomura does not teach an organosulfur protective layer in a metallic lithium anode, as the Examiner asserts on page 3 of the Office Action. The Examiner failed to address this argument in the Office Action. As stated by the Examiner on page 8 of the Office Action, "The Sotomura et al. reference uses a composite electrode with an organic disulfide fro [sic] a battery which provides high voltage when used with a lithium anode." This statement makes it clear that the organic disulfide is not a part of the lithium anode, but rather is a part of the composite electrode, which does not include a lithium metal layer.

Further, as also stated in the previous response, Sotomura is directed to a completely different invention than that of Skotheim. Sotomura teaches an electrode composite including an organosulfur compound and a polymer electrolyte (see column 4, line, 15 and column 5, lines 43-58). However, this electrode composite does not include a lithium metal layer, as required by independent claims 1 and 24. Additionally, this electrode composite is used in the cathode electrode, not in the anode electrode (see column 1, lines 10-11 and column 5, line 66-column 6, line 2). Therefore, there is no teaching or suggestion in Sotomura to use an organosulfur compound and an ionic conductive polymer in a negative electrode.

The Examiner incorrectly uses the assertion that anode and cathode become interchangeable in a secondary battery to combine the teachings of Skotheim and Sotomura. These references describe the initial anode and the initial cathode. When the battery is charged or discharged, the charges of the electrodes may change. However, the materials of the electrodes do not change. In both Skotheim and Sotomura, the electrode that is initially negatively charged is referred to as the anode and includes lithium, and the electrode that is initially positively charged is referred to as the cathode and does not contain lithium. Neither reference discloses the inclusion of an organosulfur compound and an ionic conductive polymer in an electrode comprising lithium, as required by independent claims 1 and 24.

Also, there is no motivation for one of ordinary skill in the art faced with the problem presented in Skotheim, to look to the teaching of Sotomura because the references address completely different problems. Skotheim is directed at providing a lithium metal anode that has been stabilized against dendrite formation, whereas Sotomura is directed at providing a cathode electrode composition containing an organic sulfide compound. The Examiner asserts on page 8 of the Office Action that, because Sotomura uses a composite electrode with an organic disulfide for a battery which provides high voltage when used with a lithium anode, the organic disulfide is capable of doping lithium ions. However, this conclusion does not provide motivation for the proposed combination and even if it did, no basis is provided for this conclusion.

It is further noted that even if one of ordinary skill in the art were to combine the teachings of Skotheim and Sotomura, one would not arrive at the claimed invention. Rather, the result would be a lithium battery having the cathode taught by Sotomura and the anode taught by Skotheim. One of ordinary skill in the art would have no motivation to modify the anode of Skotheim based on Sotomura's teachings relating to a cathode.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 1 and 24. Claims 2-7, 9-17, and 19-23 depend from claim 1 and are

allowable at least for this reason. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features of the claimed invention, Applicants respectfully submit that independent claims 1 and 24, and all the claims that depend therefrom, are allowable.

Claims 8 and 18 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Skotheim in view of Sotomura, in further view of Japanese Publication No. 10-101793 to Zuiho, *et al.*

Applicants respectfully submit that claim 1 is allowable over Skotheim and Sotomura, and Zuiho fails to cure the deficiencies of Skotheim and Sotomura noted above with regard to claim 1. Hence, claims 8 and 18 are allowable at least because they depend from an allowable claim 1.

Claims 24 and 25 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Skotheim in view of Sotomura, in further view of U.S. Patent 5,523,179 issued to Chu ("Chu") and U.S. Patent 6,030,719 issued to Fauteux *et al.* ("Fauteux").

As stated in the previous response, Chu and Fauteux fail to cure the deficiencies of Skotheim and Sotomura. It is noted that while Chu discloses an active-sulfur material in a positive electrode, Chu provides no such teaching regarding a negative electrode. The Examiner cited Fauteux for the teaching that an anode and cathode become interchangeable with each other depending on whether the cell is charging or discharging. However, even if the negative electrode of Chu, which comprises a lithium metal layer, becomes the positive electrode, and the positive electrode of Chu, which comprises the active-sulfur material, becomes the negative electrode, one does not arrive at the claimed invention. Rather, in this scenario, the negative electrode comprises an active-sulfur material, but not a lithium metal

layer. Therefore, none of the references teach an electrode including both an organosulfur material and a lithium metal layer, as required by independent claim 24.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claim 24. Claim 25 depends from claim 24 and is allowable at least for this reason. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features of the claimed invention, Applicants respectfully submit that independent claim 24, and the claim that depends therefrom, are allowable.

CONCLUSION

Applicants believe that a full and complete response has been made to the pending Office Action and respectfully submit that all of the stated objections and grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,

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